

Review paper

Establishing relation between gold and crude oil prices and predicting the futuristic trends for India

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Abstract: Gold is a very precious and an important metal that has been plays a major role in the economy even from the ancient times. Unlike paper currency gold is having a very good value and keeps changing every day. Moreover, gold has been an excellent hedge against inflation and is expected to rise as cost of living rises. It is said that crude oil influences the price of gold. This paper focuses on finding the extent of relationship between gold and crude oil prices and predicting the futuristic trend values.

Keywords: Gold, Crude oil, Trend Analysis.

1.Introduction

Gold is a substance component with the image Au (from Latin: aurum) and nuclear number 79, making it one of the higher nuclear number components that happen normally. In its most flawless structure, it is a brilliant, somewhat rosy yellow, thick, delicate, pliable, and malleable metal. Synthetically, gold is a change metal and a gathering 11 component. It is one of the least receptive substance components and is strong under standard conditions. Gold frequently happens in free natural (local) structure, as pieces or grains, in rocks, in veins, and in alluvial stores. It happens in a strong arrangement with the local component and furthermore normally alloyed with copper and palladium. Less ordinarily, it happens in minerals as gold mixes, frequently with tellurium. As of September 2017, gold is esteemed at around \$42 per gram (\$1,300 per troy ounce).

Like different valuable metals, gold is estimated by troy weight and by grams. Be that as it may, India it is estimated in grams and evaluated in Rupees. The extent of gold in the amalgam is estimated by karat (k), with 24 karat (24k) being unadulterated gold, and lower karat numbers relatively less. The immaculateness of a gold bar or coin can likewise be communicated as a decimal figure going from 0 to 1, known as the millesimal fineness, for example, 0.995 being about unadulterated.



Figure 1: Pure Gold

The cost of gold is resolved through exchanging the gold and subsidiaries markets, however a method known as the Gold Fixing in London, beginning in September 1919, gives an everyday benchmark cost to the business. The early evening time fixing was acquainted in 1968 with give a cost when US markets are open.

Raw petroleum is normally happening, foul oil-based commodity made out of hydrocarbon stores and other natural materials. A sort of petroleum derivative, unrefined petroleum can be refined to create usable items, for example, gas, diesel and different types of petrochemicals. It is a non-sustainable asset, which implies that it can't be supplanted normally at the rate we devour it and along these lines it is a restricted asset. Raw petroleum is regularly acquired through boring, where it is normally found close by different assets, for example, flammable gas (which is lighter and accordingly sits over the raw petroleum) and saline water (which is denser and sinks beneath). It is then refined and handled into an assortment of structures, for example, fuel, lamp oil, and black-top, and offered to customers.

In spite of the fact that it is regularly called "dark gold," unrefined petroleum has extending thickness and can fluctuate in shading from dark to yellow contingent upon its hydrocarbon creation. Refining, the procedure by which oil is warmed and isolated in various parts, is the primary stage in refining.

The cost of oil assumes an essential job in the assurance of the cost of gold and gold-supported ETFs. A significant connection among gold and oil is swelling. As unrefined petroleum costs rise, expansion likewise rises. Gold is known to be a decent fence against swelling. The estimation of gold possibly increments when swelling rises. Over 60% of the time, gold and unrefined petroleum have an immediate relationship.



Figure 2: Crude oil

Gold and unrefined petroleum are additionally related in that an ascent in the cost of oil hoses financial development because of its extreme mechanical use. Hosed financial development unfavorably influences most businesses. This can prompt a fall in value markets, which helps the interest for elective resources, for example, gold. Gold's attractive power is in play here. The recessionary stage would be useful for valuable metal darlings by pushing gold costs higher.

2. Methodology

The prices of gold and crude oil have been collected. The available data has been converted to desired format (Gold in 1 gram per 24 Carat, Crude oil in Rupees per liter). The method of Spears man Rank Correlation is been used to find the existence of relationship between Gold and Crude oil prices. The trend of crude oil and gold will be found using the Method of Least Squares. The value will be predicted for 6 years starting from **2020 to 2025**.

3. Data used

The data that is used is secondary data and has been collected from the websites given in the reference. The figures given in the websites is converted into format which is comfortable for calculation. (see table 1)

- The figure chosen for bullion gold is originally available in 10 grams has been converted to 1 gram.
- The data available of crude oil is in dollars per barrel which is converted to rupees per milliliter

Table 1: Converted Data which is going to be used

Bullion Gold		Crude Oil	
Year	Price (in rupees/gram)	Year	Price (in rupees/ml)
2010	1850	2010	0.02286
2011	2640	2011	0.02785
2012	3105	2012	0.03161
2013	2960	2013	0.03486
2014	2800.65	2014	0.03652
2015	2634.35	2015	0.01929
2016	2862.35	2016	0.01822
2017	2966.75	2017	0.02667
2018	3143.8	2018	0.02857
2019	3522	2019	0.02552

4. Procedure

Finding the nature and extent of relationship between gold and crude oil using Spearman Rank correlation method:

Table 2: Spears man rank Correlation Method.

X	Y	Rank of X	Rank of Y	D=R _x -R _y	D ²
1850	0.02286	1	4	-3	9
2640	0.02785	3	6	-3	9
3105	0.03161	8	8	0	0
2960	0.03486	6	9	-3	9
2800.65	0.03652	4	10	-6	36
2634.35	0.01929	2	2	0	0
2862.35	0.01822	5	1	4	16
2966.75	0.02667	7	3	4	16
3143.8	0.02857	9	7	2	4
3522	0.02552	10	5	5	25
Total				0	124

Using the Spears man Rank Correlation Formula we get,

$$\rho = 1 - \frac{6 \sum D^2}{n(n^2-1)}$$

$$= 1 - \frac{6(124)}{10(10^2-1)}$$

$$= 0.25$$

Thus, the obtained value is positive and less than 0.30 showing the correlation is weak. This means that the relationship between the two commodities exist but the price of crude oil does not influence the price of gold to a larger extent. Hence in India the relationship between gold price and crude oil is very weak. Predicting the futuristic trend for Crude oil and Gold price for 5 years using the method of Least squares.

4.1 Trend for bullion Gold:

Table 3: Method of least squares for Bullion Gold

Year	Y (Price (In rupees/gram))	X	X ²	XY	Y ^t =a+bX
2010	1850	-5	25	-9250	2328.8
2011	2640	-4	16	-10560	2430.7
2012	3105	-3	9	-9315	2532.6
2013	2960	-2	4	-5920	2634.5
2014	2800.65	-1	1	-2800.65	2736.4
2015	2634.35	0	0	0	2838.3
2016	2862.35	1	1	2862.35	2940.2
2017	2966.75	2	4	5933.5	3042.1
2018	3143.8	3	9	9431.4	3144
2019	3522	4	16	14088	3245.9
Total	28484.9	-5	85	-5530.4	

Using the necessary formula for finding the values of a and b, we get

$$a = 2838.3$$

$$b = 101.9$$

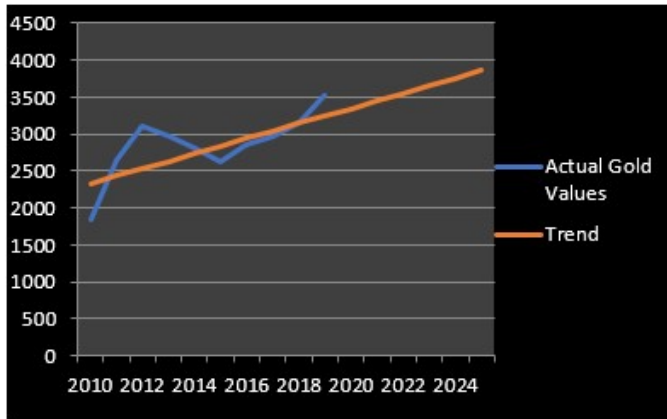
Substituting in the trend formula, we get the trend value for the years from 2010 to 2019. Below is the trend predicted for the years 2020-2025

Table 4: Predicted trend value for 6 years

Year	Trend
2020	3347.8
2021	3449.7
2022	3551.6
2023	3653.5
2024	3755.4
2025	3857.3

Note: The above provided trend data is not exact. It is just approximate. The actual gold value will be plus or minus 500 for the given trend.

Figure1. Actual bullion gold values and trend value



From the above chart, we can clearly infer that the actual values and trend values do not have a massive difference in them. Thus, we can expect the future gold value to lie plus or minus 500 with the trend value.

4.2. Trend for crude oil

Table 5: Method of least squares for crude oil

Year	Y(Price) (In rupees/gram))	X	X ²	XY	Y ^t =a+bX
2010	0.02286	-5	25	-0.1143	0.02905
2011	0.02785	-4	16	-0.1114	0.02868
2012	0.03161	-3	9	-0.09483	0.02831
2013	0.03486	-2	4	-0.06972	0.02794
2014	0.03652	-1	1	-0.03652	0.02757
2015	0.01929	0	0	0	0.0272
2016	0.01822	1	1	0.01822	0.02683
2017	0.02667	2	4	0.05334	0.02646
2018	0.02857	3	9	0.08571	0.02609
2019	0.02552	4	16	0.10208	0.02572
Total	0.27197	-5	85	-0.16742	

Using the necessary formula for finding the values of a and b, we get

$$a=0.0272$$

$$b= - 0.00037$$

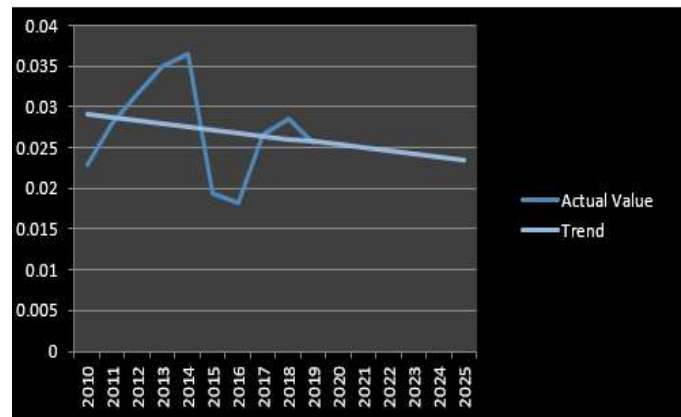
Substituting in the trend formula, we get the trend value for the years from 2010 to 2019. Below is the trend predicted for the years 2020-2025

Table 6: Predicted trend value for 6 years.

Year	Trend
2020	0.02535
2021	0.02498
2022	0.02461
2023	0.02424
2024	0.02387
2025	0.0235

Note: The above provided trend data is not exact. It is just approximate. The actual gold value will be plus or minus 500 for the given trend.

Figure 2. Actual bullion Crude oil values and trend value



From the above chart, we can clearly infer that the actual values and trend values do not have a massive difference in them. Thus, we can expect the future crude oil value to lie plus or minus 500 with the trend value.

5. Declaration

- Study limitations: None
- Funding source: None
- Competing Interest: None

6. Conclusion

Gold is a very ancient metal and its usage dates back to the Egyptian era. It was very important metal to the Egyptians so much that they even built the top of the pyramids of Giza using solid gold. Gold has unique physical chemical characteristics that make it very valuable. Gold is most malleable and ductile of all metals, has very high corrosion resistance properties and does not easily oxidize. Gold though expensive plays a very big part in influencing the economy of a country. Gold is the most trusted commodity for trade and exchange between countries. It plays a vital role of setting Fiscal policy, monetary policy and values of the currency.

Globally Crude oil is one of the most important fuels and historically has contributed to over a third of the world's energy consumption. Crude oil is a basis of lots of products such as for transportation fuels like gasoline, diesel and jet fuel. This also plays a major role in heating and energy generation. The usage of crude oil dates back to 1820's where it was mainly used for lamp and heating. Oil price increase is generally thought to

increase inflation and reduce economic growth. Oil prices directly affect the prices of goods made with petroleum products.

In the above research we can find the increasing trend in gold price and decreasing trend in crude oil price which is good for the economy. We also busted the myth of gold price getting influenced by the price of crude oil. But, please note that the above predicted trend is only under normal economic conditions. Considering the present COVID situation there may be a very high decrease in every good in our society including land and groceries

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